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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,107	06/20/2003	Prathyusha K. Salla	132535	7816

7590 04/25/2007  
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EXAMINER

AZARIAN, SEYED H

ART UNIT PAPER NUMBER

2624

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/25/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/600,107	<b>Applicant(s)</b> SALLA ET AL.	
	<b>Examiner</b> Seyed Azarian	<b>Art Unit</b> 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 31 January 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 15-17 and 19-25 is/are rejected.
- 7) ☒ Claim(s) 4-14 and 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **RESPONSE TO AMENDMENT**

1. This action replaces the previous office action because the error regarding inventor name. Please disregard the previous action. The shortened statutory time period is reset to run "THREE MONTHS" from the mailing data of this action.

### **Claim Rejections - 35 USC § 103**

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3, 15-17 and 19-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yavuz et al (U.S. patent 6,539,074) in view of Yavuz et al (U.S. patent 6,522,712).

Regarding claim 1, Yavuz (074) discloses a method for retrospective internal gating comprising (column 8, lines 31-45, retrospective gating);

acquiring images at multiple z-locations  $z_1 \dots z_n$  and at different times  $t_1 \dots t_n$  at each of the z-locations to obtain a plurality of acquired image sets, each acquired image set including only the images acquired at a single one of the z-location (column 3, lines 25-35, a slice image of the axis based on a plurality of projection views selected from respective ones of the plural sets, also column 9, lines 13-17 data values for the same axial position  $Z_0$ , and column 16, lines 22-41, the gantry rotation period  $T$ , is less than the nominal period of the cardiac cycle);

However regarding claim 1, Yavuz (074) discloses (Fig. 15 column 16, lines 58-67, reconciliation (synchronized) of the selected projection view sets, but does not explicitly state it corresponding “reordering the images within at least one of the acquired image sets to obtain at least one synchronized image set”. On the other hand Yavuz (712) in the same field of reconstruction of tomography teaches (column 33, lines 5-12, a technique for Re-ordering in the phase Domain, further column 34, lines 7-19, an operation 3730 provides a reconciliation between the axial positions at which the projection view of a given set represent the object and the axial position at which the stacked slice images are to represent the object).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Yavuz (074) invention according to the teaching of Yavuz (712) because combination of two provides reordering the images acquired at a z-location, which can easily be implemented in tomography device.

Regarding claim 2, Yavuz (074) discloses a method in accordance with claim 1 further comprising: extracting motion information from the images by using temporal data acquired at different times  $t_1 \dots t_n$  at each of the z-locations (Fig 11A-11C, also column 15, line 50 through column 16, line 8, refer to different trigger delays can be used to generate a four-dimensional model of the heart).

Regarding claim 3, Yavuz (074) discloses a method in accordance with claim 2 wherein reordering comprises cyclically reordering the images at each of the z-locations by synchronizing the motion information to have a common starting point (column 15, line 50 through column 16, line 8, refer to different trigger delays can be used to generate a four-dimensional model of the

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heart, also Fig. 15 column 16, lines 58-67, reconciliation (synchronized) of the selected projection view sets).

Regarding claim 15, Yavuz (074) discloses a method in accordance with claim 1 wherein acquiring includes acquiring the images for a respiratory cycle of an object and at least one of a two-third and a complete gantry rotation (Fig. 1, column 4, line 63 through column 5, line 18, multiple cardiac cycles also refer to rotation of the gantry).

Regarding claim 16, Yavuz (074) discloses a method in accordance with claim 1 further comprising: designating one of the images in a temporal sequence  $t_1 \dots t_n$  at one of the z-locations as a reference image (column 9, lines 13-17 data values for the same axial position  $Z_0$ , also column 16, lines 22-41, the gantry rotation period  $T$ , is less than the nominal period of the cardiac cycle);

determining a closest image in which motion of an organ is minimal with respect to a position of the organ in the reference image, the closest image being an image in the temporal sequence  $t_1 \dots t_n$  at a z-location adjacent the z-location of the reference image (see claim 1, also column 14, lines 31-54, refer to reference).

Regarding claim 19, Yavuz (074) discloses a method in accordance with claim 1 wherein reordering comprises cyclically reordering a four-dimensional (4D) set of the images based on at least one of 1-dimensional (1D) motion information of an organ that is imaged and 2-dimensional (2D) image information of the images (see abstract image generation from four-dimensional projection data of an imaged object, also claim 1);

the cyclical reordering based on the 1D motion information providing a 1<sup>st</sup> set of reordered images and the cyclical reordering based on the 2-D information providing a 2<sup>nd</sup>

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set of reordered images (column 8, line 61 through column 9, line 18, the two dimensional and one dimensions of the sonogram corresponds to angular position of the fan beam).

Regarding claim 20, Yavuz (074) discloses a method in accordance with claim 19 further comprising comparing the order of the first and second sets of reordered images to determine whether there is match between the orders of the first and the second sets (Fig. 15 column 16, lines 58-67, reconciliation (synchronized) of the selected projection view sets).

Regarding claim 21, Yavuz (074) discloses a method in accordance with claim 1 wherein acquiring the images includes acquiring the images for one breath cycle of an object plus at least one of 0.33 seconds and 0.5 seconds (column 9, lines 48-64, .5 second).

Regarding claim 22, Yavuz (074) discloses a computer-readable medium encoded with a program configured to, acquire images at multiple z-locations  $z_1 \dots z_n$  and at different times  $t_1 \dots t_n$  at each of the z-locations to obtain a plurality of acquired image sets, each acquired image set including only the images acquired at a single one of the z-location, (see claim 1, also column 18, lines 56-67, "computer-readable medium encoded with a program" for performing tomographic image generation).

Regarding claim 24, Yavuz (074) discloses an imaging system comprising, a scanner configured to generate attenuation data by scanning an object; and a controller electrically coupled to the scanner, the controller configured to: acquire images at multiple z-locations  $z_1 \dots z_n$  and at different times  $t_1 \dots t_n$  at each of the z-locations to obtain a plurality of acquired image sets, each acquired image set including only the images acquired at a single one of the z-location (see claim 1, Fig. 1, element 130 (controller), also column 5, lines 46-54, refer to controller).

Regarding claim 25, Yavuz (074) discloses a computed tomography (CT) imaging system comprising: a radiation source; a radiation detector; and a computer electrically coupled to the source and the detector, the computer configured to: acquire CT images at multiple z-locations  $z_1 \dots z_n$  and at different times  $t_1 \dots t_n$  at each of the z-locations, (see claims 1 and 24, also column 6, lines 25-43, performing tomographic image, and computer 136).

With regard to claims 17, 23 the arguments analogous to those presented above for claims 1, 16, 22 are respectively applicable to claims 17, 23.

### ***Allowable Subject Matter***

4. Claims 4-14 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowable subject matter.

With respect to claim 4, closest prior art of Yavuz does not disclose or suggest, among other things, "dividing the mean intensity image into a matrix of blocks of a desired size of region of interest (ROI), generating a binary image to distinguish organs that are imaged from a background of the binary image, wherein the organs include internal organs and an outer abdominal wall and measuring mean intensity values at times  $t_1 \dots t_n$  for each of the selected ROI blocks, the mean intensity values measured from temporal data acquired at different times  $t_1 \dots t_n$  at the z-location at which the mean intensity image is computed; and plotting the mean intensity values as a function of times". Additionally with respect to claim 18, the closest prior art of Yavuz does not disclose or suggest, among other things, "identifying the organ boundary

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in the reference images and images at the z-location of the closest image, the images at the z-location of the closest image including the closest image, extracting normal flow vectors from the organ boundary in the reference image and the images at the z-location of the closest image, fitting the normal flow vectors within an affine motion model that outputs a measure of a motion of the organ and comparing motions of the organ in the images at the z-location of the closest image with the motion of the organ in the reference image”.

These key features in combination with the other features of the claimed invention are neither taught nor suggested by the art of record.

### Other prior art cited

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(U.S. patent 6,556,695) to Packer et al is cited for method for producing high-resolution real-time images of structures and function during medical procedures.

(U.S. patent 6,298,260) to is cited for respiration responsive gating means and apparatus and method using the same.

(U.S. patent 6,144,874) to is cited for respiratory gating method for MR imaging.

(U.S. patent 5,871,019) to Belohlavek is cited for fast cardiac boundary imaging.

(U.S. patent 6,501,981) to Schweikard et al is cited for apparatus and method for compensating for respiratory and patient motions during treatment.

### **Contact Information**



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6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seyed Azarian whose telephone number is (571) 272-7443. The examiner can normally be reached on Monday through Thursday from 6:00 a.m. to 7:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella, can be reached at (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR.

Status information about the PAIR system, see [http:// pair-direct.uspto.gov](http://pair-direct.uspto.gov). Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Seyed Azarian*  
Patent Examiner  
Group Art Unit 2624  
April 21, 2007

A handwritten signature in cursive script that reads "Seyed azarian".